

# Public Perception of Median Treatment for Developed Urban Roads

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## ABSTRACT

This paper reviews the public perception of the raised median and continuous two-way left-turn lane for three median improvement projects in developed land-use corridors. Each project received substantial citizen feedback regarding median treatment during the public informational meeting process. Citizen comments focused on adjacent land use, access, safety, and cost considerations.

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## INTRODUCTION

Roadway improvement projects are characterized by unique retrofit restrictions that are not typically issues with new road design and construction. Often, an existing two-lane road with dense development cannot be widened without dramatically impacting the adjacent property owners. Major roads often evolve from a collector road designation with low traffic volumes to major thoroughfares with considerable traffic demand. With these contrasting characteristics (adjacent development versus increased traffic volumes), transportation engineers must carefully balance road improvements and the impact upon adjacent land use as a result of these improvements. A typical situation in urban settings is how to accommodate mid-block left-turning movements on widened roads. Two common improvements include construction of a raised median or a two-way left-turn lane (TWLTL). Both physical roadway improvements introduce functional enhancements to the road environment; however, the median treatments are not always perceived by the public as acceptable solutions.

Over a period of several years, Cobb County in the greater Atlanta region has aggressively undertaken road improvement and widening projects. A 1 percent sales tax program for road improvements was the primary source of funding for these recently completed projects. On two occasions, both alternatives were presented at the public hearing and the final decision for median improvements was heavily based upon feedback from the public. The goal of this paper is to summarize concerns and considerations expressed by the public regarding the two alternative treatments and to support these observations with three specific case studies.

## PREVIOUS RESEARCH

In recent years, researchers have evaluated the merits of both the raised median and the TWLTL. The focus of this previous research includes several areas of emphasis. Cost effectiveness and safety are two of the most frequently identified constraints for application of the median treatments. An additional focal point of previous work includes the suitability and application of each median treatment. Clearly, these three specific emphasis areas are not independent of each other. Current road development and improvement procedures, however, require that public input be a consideration in the design process. For this reason, adjacent land use is often included in the evaluation process.

Previous research has focused substantial emphasis on the safety implications of medians and TWLTLs. Squires and Parsonson explained that implementing either type of median treatment reduces the number of crashes experienced on an undivided road that has a similar number of through lanes and no median treatment (1). Bonneson and McCoy determined that crashes are more frequent when the adjacent land use is business or office than when the adjacent land is residential or industrial (2). This observation is consistent regardless of median type. They further indicated that the use of undivided roads versus TWLTL crash frequency is similar for business and office land use. Though this finding is contrary to previous studies, they suggested that on-street parking in the earlier studies confounded the safety evaluations.

Bretherton et al. indicated that crash reduction will occur when the left-turn vehicle is removed from the traffic stream. The use of a TWLTL may accommodate this need; however, it also provides good access to adjacent property and may result in excessive driveway development (3). Additionally, if traffic volumes are substantial (greater than 28,000 vehicles per day), vehicles utilizing TWLTLs have trouble finding acceptable gaps in opposing traffic that will permit a safe turning maneuver. Other research suggests that TWLTLs are only safer than raised medians when traffic volumes are low and there are few concentrated sources of traffic entering or leaving the road (1). Squires and Parsonson further suggested that the safety of a TWLTL is a factor of the number of through lanes, driveways, signals, and approaches within the subject corridor.

Many studies tout the safety of raised medians when they are compared to TWLTLs. Box suggests that safety studies based on crash reports may provide questionable results because often the vehicle damage for these crashes may be minimal and the crash never reaches an official report file status (4). Additionally, due to the limitation of mid-block left-turn maneuvers on raised median sections, it is likely that many drivers use alternative approach strategies and their vehicles are redirected to area cross streets. This redirection of vehicles may therefore divert the crash locations to other roads proximate to the improved corridor. Alternatively, the migration of crashes to other

streets or intersections can be avoided by strategically constructed mid-signal median openings designed to facilitate U-turn activity (2). In general, for roads with traffic volumes greater than 20,000 vehicles per day, the raised curb median treatment appears to be associated with fewer crashes than the TWLTL (5). Parsonson suggested two principal recommendations for agencies evaluating median treatments. First, due to safety considerations, all new and reconstructed principal and major thoroughfares should be designed with raised medians. Second, existing arterials with TWLTLs should be considered for installation of a raised median if the projected growth in traffic reaches or exceeds 24,000 to 28,000 vehicles daily (6).

Many previous studies focused on suitable application of each median treatment and often compare the two treatments in this evaluation. The American Association of State Highway and Transportation Officials (AASHTO) suggests TWLTLs are appropriate for use on arterial highways with low speeds (40 to 70 km/h) and no heavy left-turn traffic concentrations (7). AASHTO further suggests that the TWLTL should be used in urban settings preferably with only two through lanes in each direction of travel. Box suggested TWLTLs are well suited for locations with limited right-of-way and frequent driveways (4). The TWLTL treatment also can offer a “compromise” between raised-curb and undivided cross sections since it provides good operational performance and unrestricted property access. The TWLTL does not, however, offer safety performance of raised curb medians nor does it provide the ability to control property access (2).

Raised medians function well in locations where there is adjacent land use, such as residential, that requires a low volume of vehicles accessing the property. Medians are also appropriate in locations where advance planning eliminates or combines driveways and where periodic median openings with left-turn bays are provided (4). Though safety aspects and the ability to use the median as an access management tool are strengths of the raised median treatment, the restriction of access to the adjacent properties is often cited as a weakness of the raised median. Operationally, the performance of the raised median treatment is excellent except in locations with significant U-turn activity (2).

Cost differentials of the two treatments are minimal. Both designs require similar right-of-way (with the median treatment slightly greater) resulting in equally cost effective construction alternatives. The financial impact of the two treatments on adjacent businesses due to constrained access (raised median option) were not considered in this cost effective determination (3).

## **CASE STUDIES**

The Cobb County Department of Transportation (DOT) improved numerous roadway corridors during the last decade. As a requirement of the project design phase, public informational meetings provided a forum by which affected citizens could review the proposed improvements and submit written comments about the design. During the early 1990s several roads included in the transportation improvement plan exhibited concentrated left-turn lane conditions. The engineers considered both the TWLTL as well as raised median with dedicated turn lanes. In many cases the DOT proposed the lower cost TWLTL alternative rather than the raised median option.

Table 1 summarizes three improvement projects included in the program. The first case study, Shallowford Road, was a two-lane street with periodic turn lanes. The adjacent land use is residential and the DOT recommended a five-lane section with a

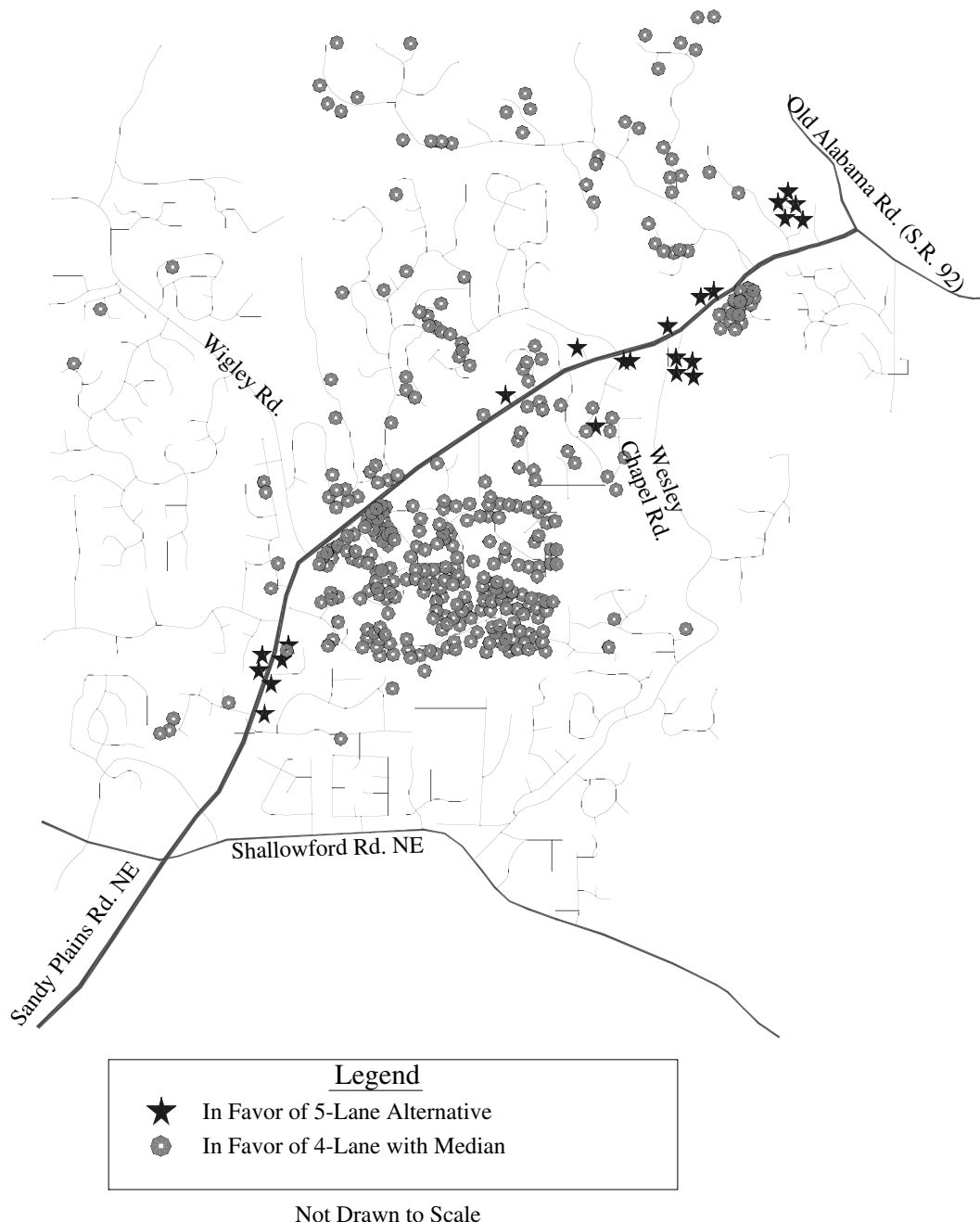
**TABLE 1 Median Treatment Case Study Summary**

Road Name:	Shallowford Road		Sandy Plains Road		Wade Green Road	
Corridor Length:	3.7 km [2.3 mi]		5.2 km [3.2 mi]		3.1 km [1.9 mi]	
Traffic Demand Design Time (vehicles/day):	13,807 to 17,982		15,000 to 12,500		27,853 (south) 18,185 (north)	
Projected 2010 Traffic Demand (vehicles/day):	32,272		33,000 vpd		58,490 (south) 36,260 (north)	
Number of Primary Intersections (including project limits):	6		5		3	
Number of Minor Intersections:	13		18		11	
Public Hearing Date:	June 1992		November 1992		October 1993	
Median Treatment Constructed:	5-lane with TWLTL		4-lane with Raised Median		<i>South:</i> 5-lane with TWLTL (commercial) <i>North:</i> 4-lane with Raised Median (residential)	
Crash Distribution	Before (1988-1990)	After (1996-1998)	Before (1989-1991)	After (1997-1998)	Before (1990-1992)	After (1997-1998)
Rear-End	49%	41%	59%	43%	36%	15%
Right-Angle	17%	30%	20%	40%	16%	44%
Left-turn with Thru	11%	7%	4%	1%	5%	5%
Fixed Object	10%	10%	9%	6%	28%	10%
Sideswipe	9%	8%	4%	9%	10%	24%
Head-On	2%	2%	0%	0%	2%	0%
Other	2%	2%	4%	1%	3%	2%
Average Annual Number of Crashes	84	137	52	84	31	41

continuous TWLTL. The DOT presented this proposed five-lane configuration at the public hearing that occurred in June of 1992. Generally the citizens at the public hearing were supportive of the design. During construction, however, some citizens aggressively pursued plan modification to a raised median. This citizen-driven attempt at redesign occurred because a similar nearby residential road was constructed with a raised median treatment and the Shallowford neighborhood property owners preferred the median alternative. The attempt to change the design at the construction stage was not successful because the median width would have been substandard (approximately 14 feet) with inadequate turn lane configurations, due to the level of project completion at the time of the citizen request.

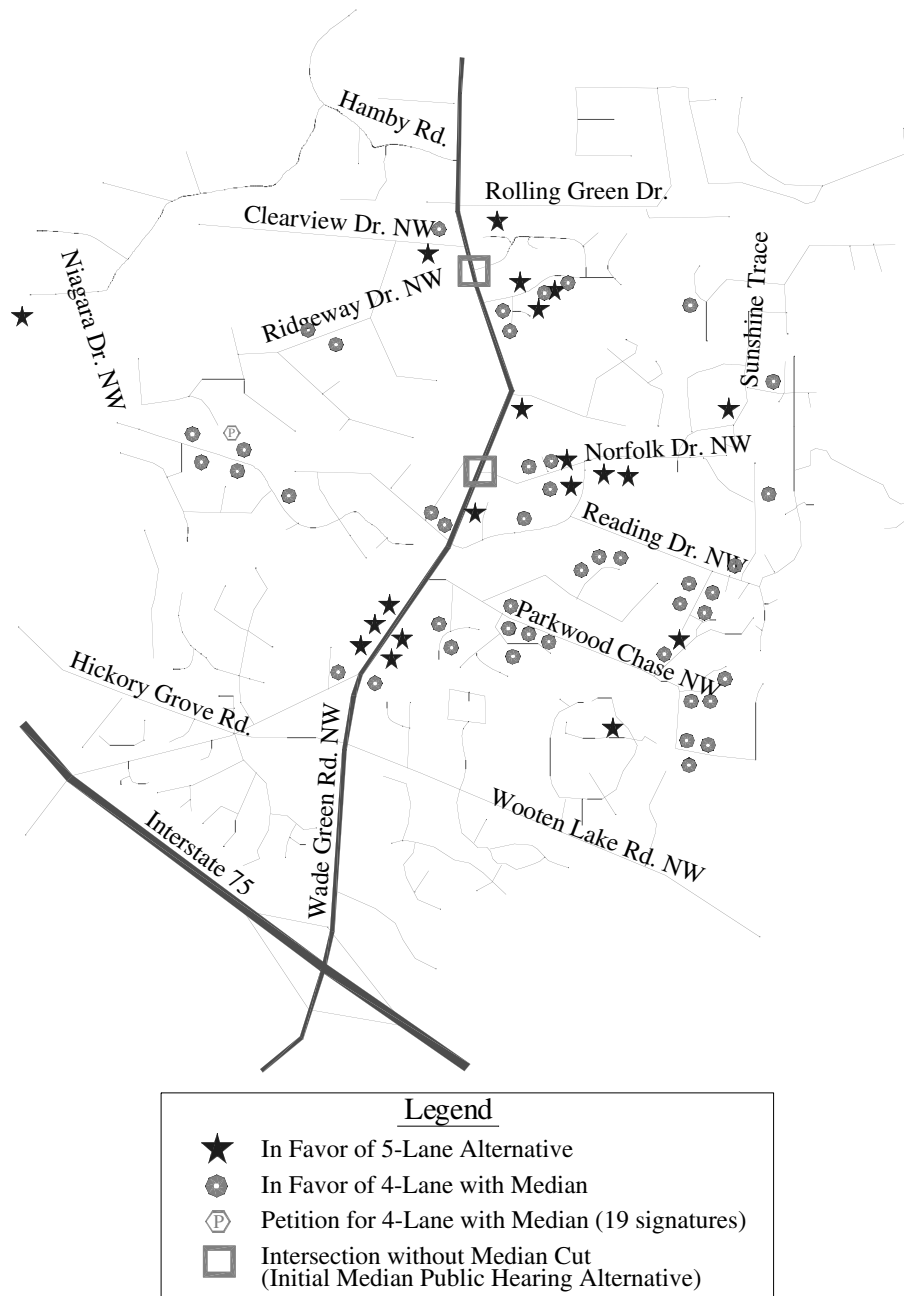
In November 1992 the DOT recommended a five-lane scenario with a TWLTL for a second project, Sandy Plains Road. They also presented an alternative four-lane section with a raised median. The introduction of both alternatives generated numerous citizen

comments. Figure 1 depicts the preferences of the public in companion to their property addresses. Generally, property owners with direct access onto Sandy Plains Road favored the TWLTL alternative. In addition, area residents on streets where a median cut would not be provided also tended to favor the TWLTL option. Area neighborhood residents with primary access from intersections with Sandy Plains Road offered overwhelming support for the raised median option. Ultimately the county constructed a raised median cross-section. The impressive public support for this alternative strongly influenced the final alternative selected.



**FIGURE 1** Sandy Plains Road public hearing comments.

The third case study presented is characterized by two distinct land use regions adjacent to Wade Green Road. The region south of Hickory Grove Road is primarily commercial while the area to the north is residential. The DOT recommended a TWLTL for the length of the project. They also offered a raised median alternative that provided limited median cuts. For example, Norfolk Drive and Wade Green Circle (see Figure 2) did not have proposed median cuts. This design would require southbound drivers to divert to adjacent neighborhood roads rather than permit direct street access from Wade Green



Not Drawn to Scale

**FIGURE 2 Wade Green Road public hearing comments.**

Road. Figure 2 depicts the October 1993 public hearing comments. Similar to the second case study, residential property owners directly located on Wade Green Road tended to prefer the five-lane alternative. Additionally, the restricted median cut locations generated support for the five-lane design. Generally, the remaining residential comments favored the raised median. Input by commercial property owners did not occur at the public hearing; however, many of the commercial owners individually met or corresponded with the County Commissioner's office with primary concern regarding enhanced property access in the form of a TWLTL configuration.

The final design for the third case study included a compromise with a TWLTL adjacent to the commercial property and a raised median adjacent to the residential region. Additional median cuts were also incorporated at the two controversial locations previously identified.

## **PUBLIC COMMENTS REGARDING TREATMENTS**

The authors reviewed public hearing comments for the three case studies as well as those for similar improvement projects. Comments addressed the following five basic areas of concern:

1. Total Project Opposition,
2. Design Based on Abutting Land Use,
3. Access Constraints,
4. Safety, and
5. Cost.

In many cases, a median treatment feature perceived as a strength by one citizen group was considered a weakness by others. Specific points and, in some instances, specific comments are summarized in detail in the following sections.

### **Total Project Opposition**

Frequently citizens at the public hearings indicated that any road improvement would not be acceptable. Generally, this sentiment was due to a concern that if the road were widened it would encourage additional traffic and adversely impact their neighborhood. Another comment often expressed was the concern that road improvement projects encourage cut-through traffic. Many citizens suggested road improvement money should be redirected to transit projects. Additionally a common public perception was that the roads were to be widened in an effort to entice commercial development. Several specific comments that emphasized public project opposition are summarized below.

- “Your project is not wanted . . . ‘If you build it, they will come!’”
- “None of them (developers) care that they leave us with a wasteland of asphalt and concrete, and raceways instead of roadways.”
- “We are dissatisfied with both alternatives . . . We want the cow and horse pastures back—it was pleasant living here then!”

### Design Based on Abutting Land Use

The greatest concern expressed by citizens was the impact the improvements would have on the adjacent property. Generally, the TWLTL option was perceived as an acceptable scenario for adjacent commercial and residential property while a raised, landscaped median helped to preserve a “residential character” to the neighborhood. Property owners immediately adjacent to the improvement corridors expressed a significant concern that land acquisitions from both sides of the streets would adversely impact the adjacent land use. Several citizens cited an improvement project completed in the 1980s where a raised, paved median was constructed and additional right-of-way was acquired on both sides of the street. The houses in the area were left with extremely small front yards and slowly the character of the street changed to a primarily commercial region. Many businesses like pawn shops or car lots began to appear on former residential sites as a perceived result of the improvement. Figure 3 shows this road corridor as it exists today.

The same project shown in Figure 3 was also frequently cited as an example of how the citizens *did not* want their median to look. The paved raised median, though offering lower maintenance costs, was perceived as a contributing factor to the decay of this corridor. Generally, when the use of a raised median was requested the citizens wanted the median to function as an enhancement to their neighborhood and preferred the median to be attractively landscaped. Figure 4 shows the typical landscaped median preferred by the citizens of Cobb County. The attractive median was perceived as a way to help retain property values rather than adversely impact them.

Commercial property owners overwhelmingly preferred the TWLTL option. In one instance, the Cobb County Developers Association submitted a letter to the Cobb County DOT requesting they reevaluate the use of a raised median. The developers cited the following four specific points that summarized why they felt raised medians should not be constructed:

1. Raised medians are not appropriate in already developed areas;
2. Georgia DOT figures on accident safety rates are broadly applied and not always attributable to the specific road in question;



**FIGURE 3** Narrow raised median with right-of-way acquired from both sides.





**FIGURE 4 Landscaped median (20 ft wide).**

3. The U-turn movements that are provided for often create a greater traffic hazard than a center turn lane;
4. Medians are generally applicable only where there are less than 10 driveways per mile.

The developers association also suggested that the median alternatives include maintenance costs in the initial cost feasibility evaluations.

Several specific comments that emphasized citizen concern regarding land use and impact upon adjacent property are summarized below.

- “Medians would decrease the value for potential commercial property.”
- One citizen wrote: “A center turn lane would be a stepping stone to commercialization of the area.”
- A citizen who wanted a median and felt preference was leaning toward commercial developers said: “. . . I guess friends in the development business are more important than thousands of tax paying residents.”
- Similar to the previous comment (but for a different road corridor) a citizen wrote: “This looks like a ‘sweetheart’ deal to help sell space in the proposed 12-story (office complex) rezoning.”

### **Access Constraints**

As clearly represented in the case studies where a raised median alternative was available, access restrictions as a result of the physical separation generated considerable concern by area residents. Similarly, businesses preferred the TWLTL option so they could have unlimited two-directional access to their property. Figure 5 shows the southern section of Wade Green Road (Case 3). At this location, numerous gas stations and fast food driveways line the street and the business owners requested that the unrestricted access be maintained in the form of a TWLTL.

Specific concerns expressed against the raised median included the restriction of emergency vehicle access to adjacent property. Often this concern can be countered by



**FIGURE 5 Two-way left-turn lane with commercial development.**

providing mountable curb; however, the median treatment proposed by Cobb County DOT (using Georgia DOT design standards) did not offer this feature. Also, emergency services often plan approach routes based upon physical road restrictions. The restrictive median cuts that limited street access to only a right turn also were cited as problems with the raised median application and detriments to appropriate emergency access. A third concern expressed regarding the raised median was adverse impact to driveway access for property immediately adjacent to the improvement corridor. Finally, many citizens stated that the raised median removed the ability for a vehicle to enter the road and treat a center lane (like a TWLTL) as an acceleration lane until an acceptable gap in traffic permitted them to enter the traffic stream.

Not all access issues for raised medians were negative. Pedestrian access, for example, was often cited as compatible with median construction since the median would provide a safe refuge for people crossing the street.

One specific citizen comment clearly states the preference indicated by adjacent business owners:

“Adding the median at our business will slow down the incoming traffic from the north. Since we have commercial property, I think we should have access from north and southbound traffic. I think a center turn lane would be a lot more appropriate. . . .”

## **Safety**

In each public hearing project engineers presented the citizens with information regarding the distribution of crashes during recent years at the improvement corridor locations. Often, the widening and median improvement projects were presented as a means of

improving safety and reducing certain types of crashes. Specifically, the median treatment alternatives were presented as a strategy for reducing the frequency of rear-end crashes within the corridors by removing left turning vehicles from the through traffic stream. Table 1 shows the distribution of crash type prior to the improvement project as well as the distribution following the improvement. At all three sites, the percentage of rear-end crashes was lower following the improvement. The distribution of right-angle crashes tended to increase following the improvement projects. The actual number of crashes also increased at all three sites following the widening and median project; however, due to the rapid regional growth the numbers of crashes for Sites 2 and 3 were less than those anticipated if the improvements had not been implemented. The number of crashes at Site 1 after the improvements were similar to the “projected” number of crashes based on the previous road condition.

Common safety concerns expressed by citizens included the perception that a TWLTL is a “suicide” lane and invites opportunity for head-on crashes. The median was generally cited as a good alternative because it physically separates opposing traffic. Several citizens expressed concern that the required U-turn movements resulting from median construction would introduce an additional hazard into the travelway. The medians were also cited as a condition where people tend to drive faster because they have less disruptive traffic conditions. Pedestrian safety and the use of raised medians to facilitate pedestrian activity was also identified as a safety advantage for the raised median treatment.

## **Cost**

The cost differential between the two median alternatives is minimal compared to the entire project construction cost. The DOT presented the cost savings for the TWLTL at the two public hearings where both alternatives were available. Due to a limited budget, the TWLTL option was recommended because it would require a slightly narrower right-of-way corridor. The general perception by the public about the cost differences were that the decision regarding which median treatment to use should not be determined based on the cheaper alternative but rather the alternative that would enhance the community the greatest. Additionally, the maintenance costs for the landscaped median treatment were perceived to be greater than those associated with the TWLTL. In general, the only citizens that were strongly influenced by the cost issue were those whose property directly abutted the roadway corridor.

## **CONCLUSIONS**

In general, the public supported the improvement projects with the median treatments. Certainly, a raised median seemed to be the preference for residential communities. Similarly, commercial property owners preferred the TWLTL option as a means of maintaining or enhancing access to their property. Often citizens provided contradictory preferences and were distressed when their specific preference did not occur. Though the existing and projected traffic volumes were presented at all of the public hearings, comments regarding the improved roadway operations or the impact the median treatment may introduce on the roadway operations were not of particular interest to the citizens. Often if a citizen did not like the crash statistics for their road they would try to find fault in the statistics rather than looking for a solution. Generally, the primary

interest of the public focused on impact on adjacent land use, access issues, safety, or cost. In several cases, the public simply demanded that the project not be constructed. The general emphasis of the citizens was on the impact the improvement would have on them individually rather than how it would influence traffic operations.

Many citizens viewed the public hearing as a forum to express dissatisfaction with their local governing agency. One interesting comment to this effect was:

“A median on this section will be better for:

- A. Potential head-on collision victims.
- B. All citizens living in the area.
- C. *All politicians at next election.*”

Though the citizen feedback summarized in this paper does not present surprising observations regarding how the public may perceive a prospective median treatment improvement project, it does offer an interesting insight into what issues are important to the citizen population and how specific approaches may be perceived. Armed with this information, agencies preparing for public hearings may wish to structure the meeting in such a way that the engineering issues are presented in a manner that more directly addresses their impacts on the individual citizen.

## ACKNOWLEDGMENTS

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